

3.1. Simple Interest

Wednesday, September 6, 2017 1:27 PM

Goals: (1) Understand and apply the simple interest Formula

(2) Solve problems using this formula

Simple Interest Formula:

$$I = P \cdot R \cdot t$$

I : interest earned or to be paid

P : Principal (amount invested)

R : interest rate (annual interest rate) (decimal)

t : time (in years)

E.g. Borrow \$100. Simple Interest. Annual Rate of 5%.
10 years. Find the amount of interest to be paid.

$$I = P \cdot R \cdot t = 100 \cdot (0.05) \cdot 10 = \$50$$

What if $t = 6$ months.

$$I = P \cdot R \cdot t = 100(0.05) \cdot (0.5) = \$2.5$$

$$t = 3 \text{ months} \longrightarrow \frac{3}{12} = 0.25$$

$$t = 5 \text{ months} \longrightarrow \frac{5}{12} \approx 0.4167$$

E.g. $I = P \cdot R \cdot t$

$$I = \$100, R = 10\%, t = 6 \text{ months.}$$

Find P ?

$$P = \frac{I}{R \cdot t} = \frac{100}{(0.1) \cdot (0.5)} = \frac{100}{0.05} = \$2000$$

E.g. $P = \$100; R = 5\%, t = 10 \text{ years}$

Total amount of money to be paid back?

$$= \text{Principal} + \text{Interest} = \$100 + \$50 = \$150$$

→ Future Value

Future Value Formula

$$A = P + I$$

$$A = P + P \cdot R \cdot t$$

$$A = P(1 + R \cdot t)$$

Future Value

E.g. $P = \$5100$
 $A = \$5227.5$
 $t = 3 \text{ months}$ } $R = ?$

$$\frac{5227.5}{5100} = \frac{5100}{5100} \cdot (1 + R \cdot (0.25))$$

$$1.025 = 1 + R \cdot (0.25)$$

$$\frac{0.025}{0.25} = \frac{R \cdot (0.25)}{0.25}$$

$$R = 0.1 \longrightarrow 10\%$$

$$A = P \cdot (1 + R \cdot t)$$

Find R ?

$$\frac{A}{P} = 1 + R \cdot t$$

$$\frac{A}{P} - 1 = R \cdot t$$

$$R = \frac{\frac{A}{P} - 1}{t}$$

Plug in #'s

E.g. Commercial for loan company: ^{per day}
 You only need to pay 24 cents (\$0.24) ^{per day} for \$500 borrowed.

You borrow \$1,225 for 118 days.

Q: ① What amount do you need to repay?

② What annual interest rate they are actually charging

$$\textcircled{1} \quad \frac{1225}{500} \cdot (0.24) \cdot 118 = \$69.38 \leftarrow \text{interest}$$

Total amount: \$1225 + \$69.38 = \$1294.38.

$$\textcircled{2} \quad I = P \cdot R \cdot t \rightarrow R ?$$

$$\$69.38 = \$1225 \cdot R \cdot \frac{118}{365}$$

$$R = \frac{69.38}{1225 \cdot \frac{118}{365}} = 17.5\%$$